WHAT IS CLAIMED IS:

1. A method for modifying the glycosylation pattern of a glycopeptide comprising an acceptor moiety for a first fucosyltransferase, said method comprising:

contacting the glycopeptide with a reaction mixture that comprises a fucose donor moiety and the first fucosyltransferase under appropriate conditions to transfer fucose from the fucose donor moiety to the acceptor moiety, such that the glycopeptide has a substantially uniform fucosylation pattern.

2. The method according to claim **1**, wherein the glycopeptide comprises a second acceptor moiety for a second fucosyltransferase, and the method further comprises contacting the glycopeptide with a reaction mixture that comprises a fucose donor moiety and the second fucosyltransferase under appropriate conditions to transfer fucose from the fucose donor moiety to the acceptor moiety, such that the glycopeptide has a substantially uniform fucosylation pattern.

3. The method according to claim **2**, wherein the glycoprotein is contacted with the first fucosyltranferase and the second fucosyltransferase simultaneously.

4. The method according to claim **2**, wherein the glycoprotein is contacted with the first fucosyltransferase and the second fucosyltransferase sequentially without isolation of product resulting from contacting with the first fucosyltransferase.

5. The method according to claim **1**, wherein the first fucosyltransferase is a member selected from FucT-IV, FucT-VI, FucT-VII and combinations thereof.

6. The method according to claim **2**, wherein the second fucosyltransferase is a member selected from FucT-IV, FucT-VI, FucT-VII and combinations thereof.

7. The method of claim **1**, wherein the fucosyltransferase is bacterial.

8. The method of claim **1**, wherein the fucosyltransferase is recombinantly produced.

9. The method of claim 1, wherein the fucosyltransferase lacks a membrane anchoring domain.

10. The method of claim 1, wherein at least about 80% of the acceptor moieties on the glycopeptide are fucosylated.

11. The method of claim 1, wherein glycopeptide is reversibly immobilized on a solid support.

12. The method of claim 1, wherein the solid support is an affinity chromatography medium.

13. The method of claim 1, wherein the glycopeptide is a full-length glycopeptide.

14. The method of claim 1, wherein the glycopeptide is a fragment of a full length glycopeptide comprising an active site of the full-length glycopeptide.

15. The method according claim 1, wherein the glycopeptide is an IgG chimera.

16. The method of claim 1, wherein the glycopeptide is a hormone, a growth factor, an enzyme, an enzyme inhibitor, a cytokine, a receptor, a ligand, or a monoclonal antibody.

17. The method of claim 1, wherein the glycopeptide is on a cell.

18. The method of claim 1, wherein the acceptor moiety comprises Galβ1-OR, Galβ1,3/4GlcNAc-OR, NeuAcα2,3Galβ1,3/4GlcNAc-OR, wherein R is an amino acid, a saccharide, an oligosaccharide or an aglycon group having at least one carbon atom and is linked to or is part of a glycopeptide.

19. The method of claim 1, wherein the fucose donor moiety is GDP-fucose.

20. The method of claim 1, further comprising, prior to step (a), contacting said glycoprotein with a glycosyltransferase other than a fucosyltransferase and a donor

moiety other than a fucose donor moiety, thereby glycosylating the glycoprotein with a glycosyl moiety other than a fucose unit.

21. The method of claim **20**, wherein the glycosyltransferase is a member selected from the group consisting of galactosyltransferase, sialyltransferase and combinations thereof.

22. A composition comprising a glycopeptide fucosylated according to the method of claim **1**.

23. The composition of claim **22**, wherein at least 80% of the acceptor moieties on the glycopeptide are fucosylated.

24. The composition of claim **22**, wherein glycopeptide is attached to a solid support.

25. The composition of claim **24**, wherein the solid support is an affinity chromatography medium.

26. The composition of claim **22**, wherein the glycopeptide is a full-length glycopeptide.

27. The composition of claim **22**, wherein the glycopeptide comprises Fucα1,2Galβ1-OR, Galβ1,3/4(Fucα1,4/3)GlcNAc-OR, NeuAcα2,3Galβ1,3/4(Fucα1,3/4)GlcNAc-OR, Fucα1,2Galβ1,3/4(Fucα1,4/3)GlcNAcβ-OR wherein R is an amino acid, a saccharide, an oligosaccharide or an aglycon group having at least one carbon atom and is linked to or is part of a glycopeptide.

28. The, composition of claim **22**, wherein the glycopeptide comprises NeuAcα2,3Galβ1,3/4(Fucα1,3/4)GlcNAc-OR, wherein R is an amino acid, a saccharide, an oligosaccharide or an aglycon group having at least one carbon atom and is linked to or is part of a glycopeptide.

29. The composition of claim **22**, wherein the glycopeptide is a hormone, a growth factor, an enzyme, an enzyme inhibitor, a cytokine, a receptor, a ligand, or a monoclonal antibody.

30. The composition of claim **22**, wherein the glycopeptide is on a cell.

31. A method of producing a recombinant glycopeptide having a fucosylation pattern that is substantially identical to a fucosylated glycopeptide having a known fucosylation pattern, said method comprising:

(a) contacting the recombinant glycopeptide with a reaction mixture that comprises a fucose donor moiety and the fucosyltransferase under appropriate conditions to transfer fucose from the fucose donor moiety to a fucose acceptor moiety on said recombinant glycopeptide, thereby producing a fucosylated recombinant glycopeptide; and

(b) terminating the transfer of the fucose to the fucose acceptor when the fucosylation pattern substantially identical to the known fucosylation pattern is obtained.

32. The method according to claim 31 further comprising:

(c) assaying the fucosylation pattern of the fucosylated recombinant glycopeptide, thereby determining whether the fucosylation pattern is substantially identical to the known fucosylation pattern.

33. The method according to claim 31 wherein the terminating is due to exhausting in the reaction mixture a member selected from the group consisting of the fucosyltransferase, the fucose donor moiety, the fucose acceptor quench with a chelator and combinations thereof.

34. The method according to claim 31, wherein the glycopeptide comprises a second acceptor moiety for a second fucosyltransferase, and the method further comprises contacting the glycopeptide with a reaction mixture that comprises a fucose donor moiety and the second fucosyltransferase under appropriate conditions to transfer fucose from the fucose donor moiety to the second acceptor moiety.

35. The method according to claim 34, wherein the glycoprotein is contacted with the first fucosyltranferase and the second fucosyltransferase simultaneously.

36. The method according to claim 34, wherein the glycoprotein is contacted with the first fucosyltransferase and the second fucosyltransferase sequentially without isolation of product resulting from contacting with the first fucosyltransferase.

37. The method according to claim 31, wherein the first fucosyltransferase is a member selected from FucT-IV, FucT-VI, FucT-VII and combinations thereof.

38. The method according to claim 34, wherein the second fucosyltransferase is a member selected from FucT-IV, FucT-VI, FucT-VII and combinations thereof.

39. The method of claim 31, wherein the fucosyltransferase is bacterial.

40. The method of claim 31, wherein the fucosyltransferase is recombinantly produced.

41. The method of claim 31, wherein the fucosyltransferase lacks a membrane anchoring domain.

42. The method of claim 31, wherein at least about 80% of the acceptor moieties on the glycopeptide are fucosylated.

43. The method of claim 31, wherein glycopeptide is reversibly immobilized on a solid support.

44. The method of claim 31, wherein the solid support is an affinity chromatography medium.

45. The method of claim 31, wherein the glycopeptide is a full-length glycopeptide.

46. The method of claim 31, wherein the glycopeptide is a fragment of a full length glycopeptide comprising an active site of the full-length glycopeptide.

47. The method according claim 31, wherein the glycopeptide is an IgG chimera.

48. The method of claim 31, wherein the glycopeptide is a hormone, a growth factor, an enzyme, an enzyme inhibitor, a cytokine, a receptor, a ligand, or a monoclonal antibody.

49. The method of claim 31 wherein the glycopeptide is on a cell.

50. The method of claim **31**, wherein the acceptor moiety comprises Galβ1-OR, Galβ1,3/4GlcNAc-OR, NeuAcα2,3Galβ1,3/4GlcNAc-OR, wherein R is an amino acid, a saccharide, an oligosaccharide or an aglycon group having at least one carbon atom and is linked to or is part of a glycopeptide.

51. The method of claim **31**, wherein the fucose donor moiety is GDP-fucose.

52. The method of claim **31**, further comprising, prior to step (a), contacting said glycoprotein with a glycosyltransferase other than a fucosyltransferase and a donor moiety other than a fucose donor moiety, thereby glycosylating the glycoprotein with a glycosyl moiety other than a fucose unit.

53. The method of claim **52**, wherein the glycosyltransferase is a member selected from the group consisting of galactosyltransferase, sialyltransferase and combinations thereof.

54. A large-scale method for modifying the glycosylation pattern of a glycopeptide comprising an acceptor moiety for a first fucosyltransferase, said method comprising:

contacting at least about 500 mg of glycopeptide with a reaction mixture that comprises a fucose donor moiety and the first fucosyltransferase under appropriate conditions to transfer fucose from the fucose donor moiety to the acceptor moiety, such that the glycopeptide has a substantially uniform fucosylation pattern.

55. A large-scale method of producing a recombinant glycopeptide having a fucosylation pattern that is substantially identical to a fucosylated glycopeptide having a known fucosylation pattern, said method comprising:

(a) contacting at least about 500 mg of the the recombinant glycopeptide with a reaction mixture that comprises a fucose donor moiety and the fucosyltransferase under appropriate conditions to transfer fucose from the fucose donor moiety to a fucose acceptor moiety on said recombinant glycopeptide, thereby producing a fucosylated recombinant glycopeptide; and

(b) terminating the transfer of the fucose to the fucose acceptor when the fucosylation pattern substantially identical to the known fucosylation pattern is obtained.